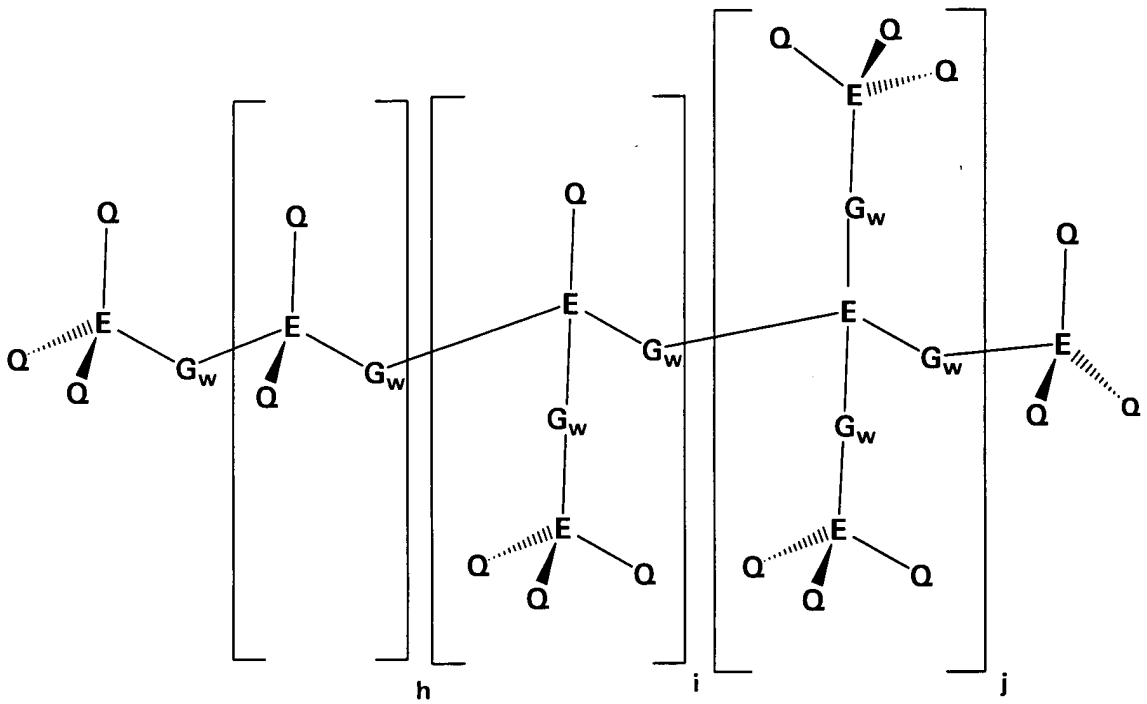
and at least one oligomer or polymer, wherein the at least one oligomer or polymer comprises at least one cage compound in the backbone of the at least one oligomer or polymer and further comprises at least one aryl, substituted aryl or branched aryl; and

a porogen that bonds to the thermosetting component.

56. (Added) The composition of claim 55, wherein the cage compound comprises an adamantane or a diamantane compound.

57. (Added) The composition of claim 56, wherein the cage compound comprises an adamantane compound.

58. (Added) The composition of claim 55, wherein the at least one oligomer or polymer comprises the structure of Formula II:

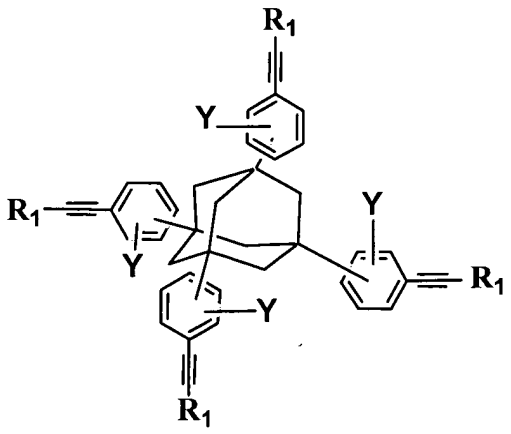


where said E is the cage compound; each of said Q is the same or different and selected from aryl, branched aryl, and substituted aryl wherein said substituents include hydrogen, halogen, alkyl, aryl, substituted aryl, heteroaryl, aryl ether, alkenyl, alkynyl, alkoxyl,

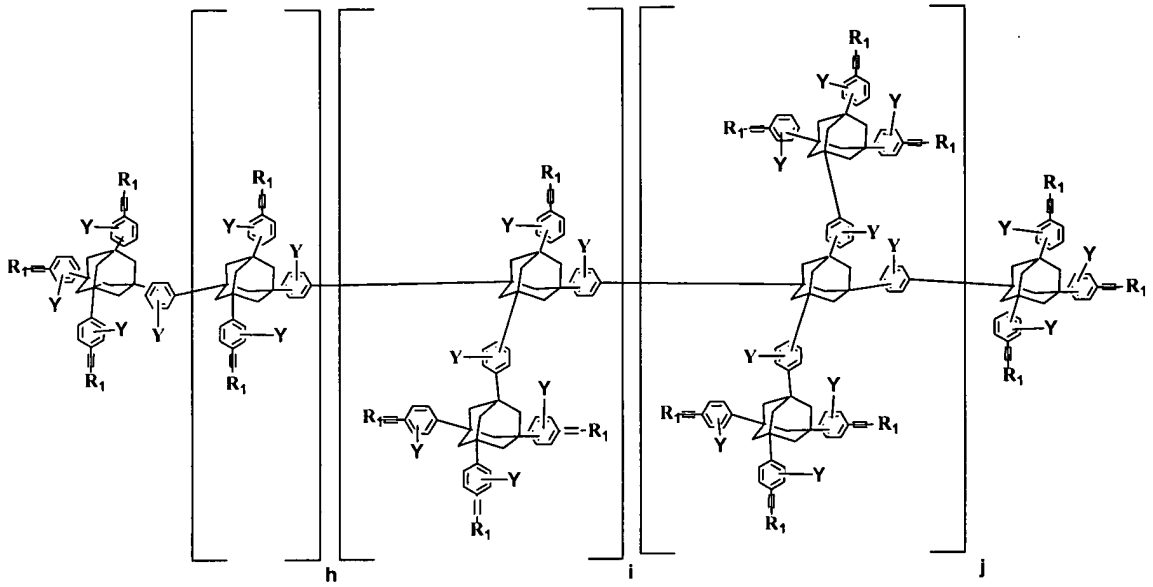
hydroxyalkyl, hydroxyaryl, hydroxyalkenyl, hydroxyalkynyl, hydroxyl, or carboxyl; said G is aryl or substituted aryl where substituents include halogen and alkyl; said h is from 0 to 10; said i is from 0 to 10; said j is from 0 to 10; and said w is 0 or 1.

59. (Added) The composition of claim 55, further comprising an adhesion promoter.

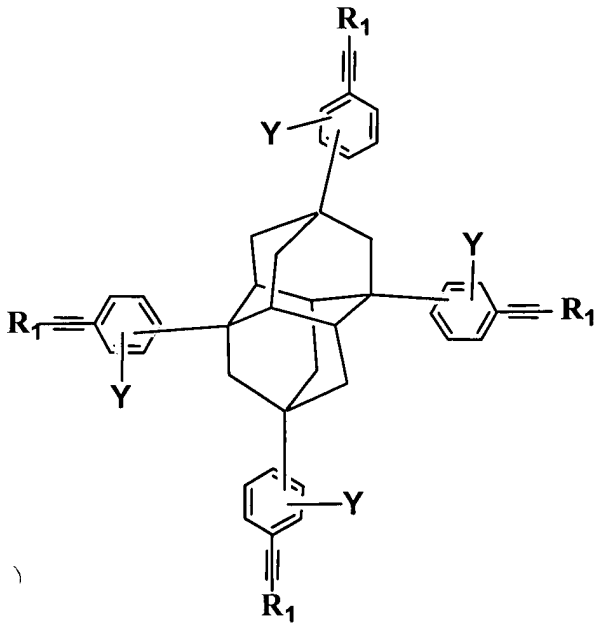
60. (Added) The composition of claim 55, wherein the thermosetting component comprises the adamantane monomer of Formula III:



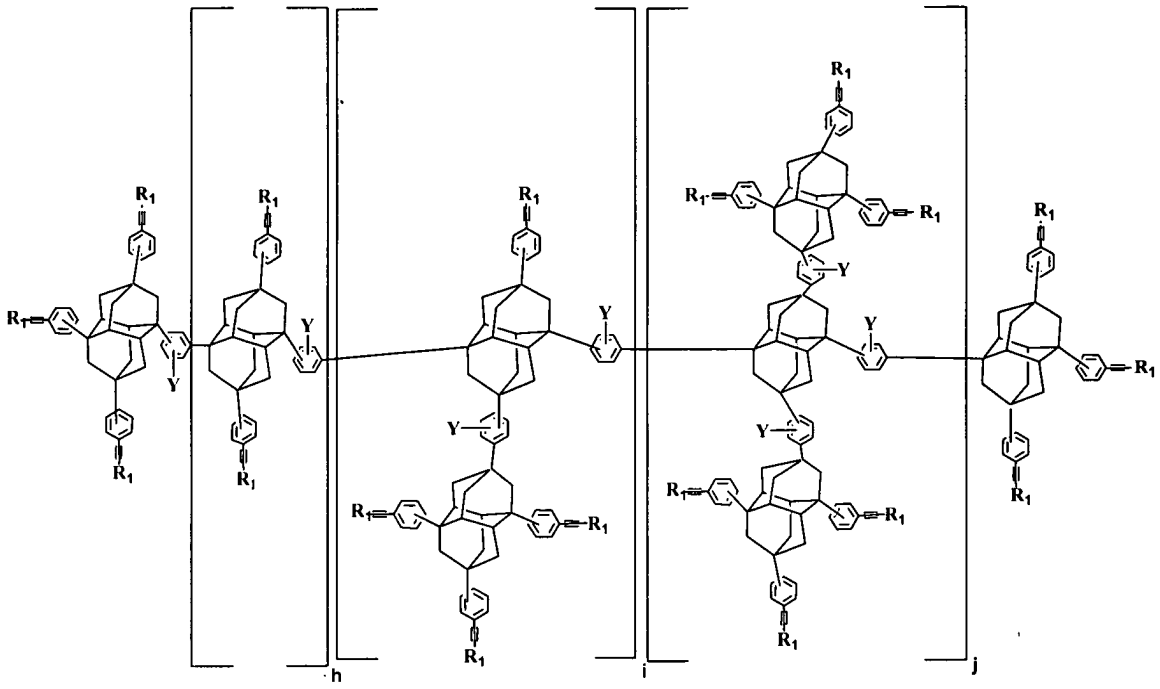
and at least one of the adamantane oligomer or polymer of Formula IV:



the diamantane monomer of Formula V:



or the diamantane oligomer or polymer of Formula VI



where h is from 0 to 10; i is from 0 to 10; j is from 0 to 10; each of R_1 is the same or different and selected from hydrogen, halogen, alkyl, aryl, substituted aryl, heteroaryl, aryl ether, alkenyl, alkynyl, alkoxyl, hydroxyalkyl, hydroxyaryl, hydroxyalkenyl, hydroxyalkynyl, hydroxyl, or carboxyl; and each of said Y is same or different and is selected from hydrogen, alkyl, aryl, substituted aryl, or halogen.

61. (Added) The composition of claim 55, wherein the thermosetting composition is functionalized.

62. (Added) The composition of claim 61, wherein the functionality comprises acetylene; 4-ethynylaniline; 3-hydroxyphenylacetylene; 4-fluorophenylacetylene or 1-ethylcyclohexylamine.

63. (Added) The composition of claim 55, wherein the porogen comprises a material having a decomposition temperature less than the glass transition temperature of the thermosetting component.

64. (Added) The composition of either of claims 55 or 63, wherein the porogen comprises a material having a decomposition temperature greater than the curing temperature of the thermosetting component.

65. (Added) The composition of claim 55, wherein the porogen comprises an unsubstituted polynorbornene, substituted polynorbornene, polycaprolactone, unsubstituted polystyrene, substituted polystyrene, polyacenaphthylene homopolymer or polyacenaphthylene copolymer.

66. (Added) The composition of either of claims 55 or 65, wherein the porogen is functionalized.

67. (Added) The composition of claim 66, wherein the functionality comprises epoxy, hydroxy, carboxylic acid, amino or ethynyl.

68. (Added) The composition of claim 55, wherein the porogen is covalently bonded to the thermosetting component.

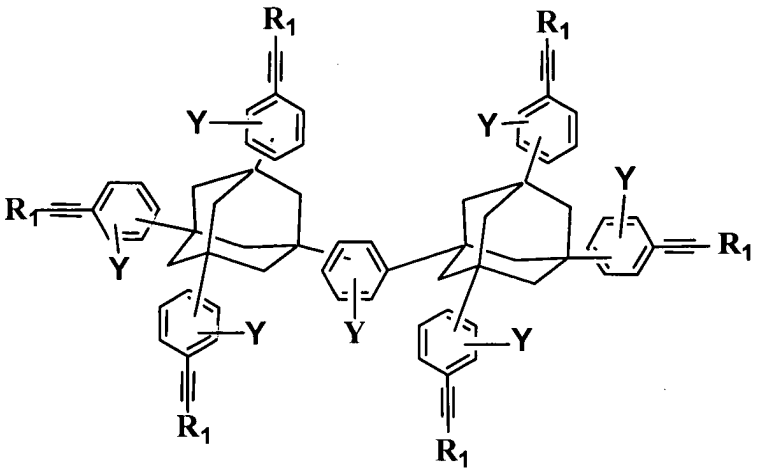
69. (Added) The composition of claim 68, wherein the porogen is covalently bonded to the thermosetting component through an ethynyl-containing group.

70. (Added) The composition of claim 69, wherein the ethynyl-containing group is acetylene.

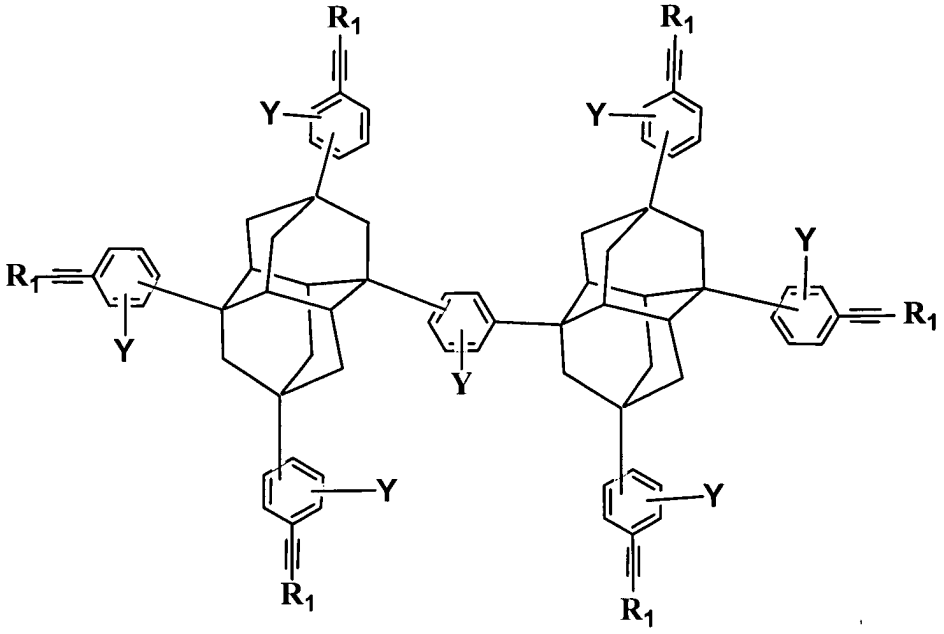
71. (Added) The composition of claim 55, wherein the monomer is present in the thermosetting composition.

72. (Added) The composition of claim 60, wherein said R_1 is aryl or substituted aryl and said Y is hydrogen, phenyl, or biphenyl.

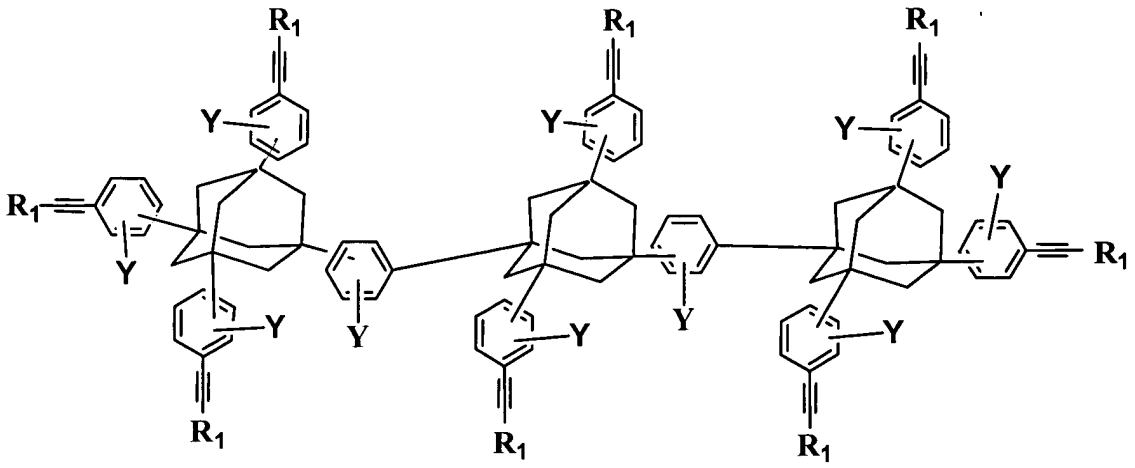
73. (Added) The composition of claim 55, wherein the at least one oligomer or polymer comprises the structure of Formula IX



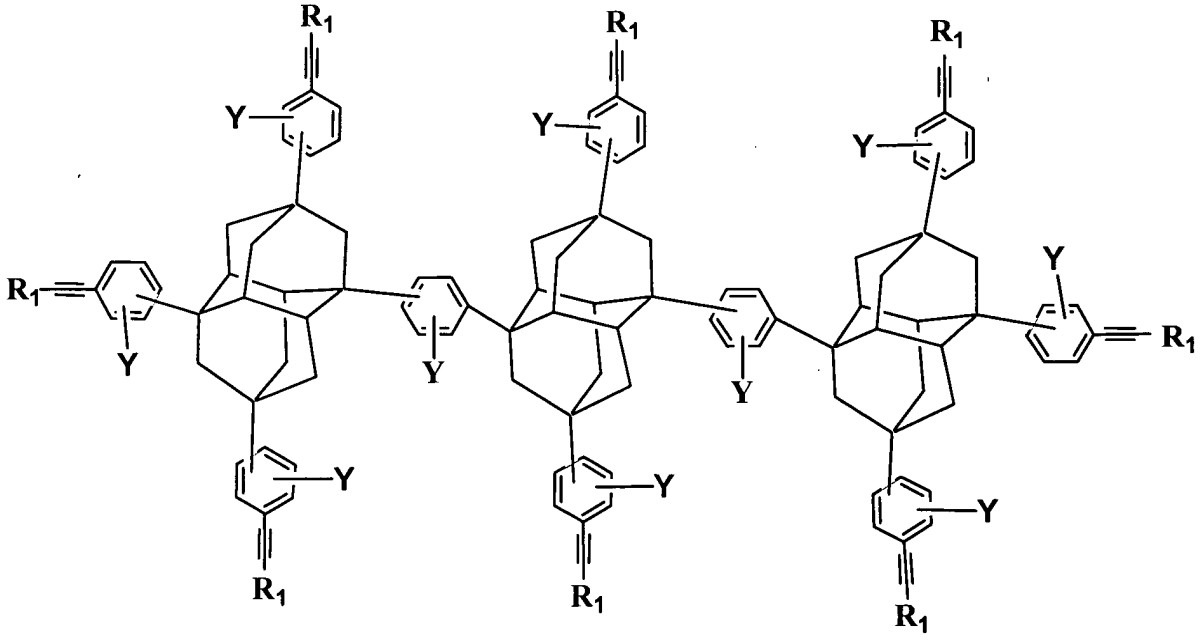
or the structure of Formula X:



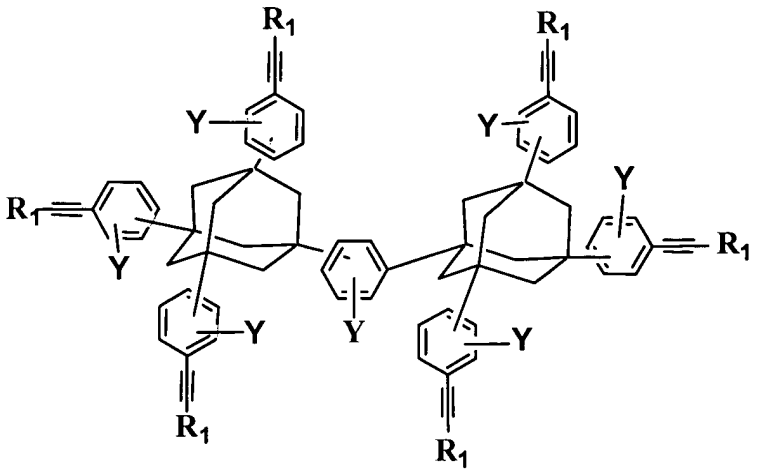
74. (Added) The composition of claim 55, wherein the at least one oligomer or polymer comprises the structure of Formula XI:



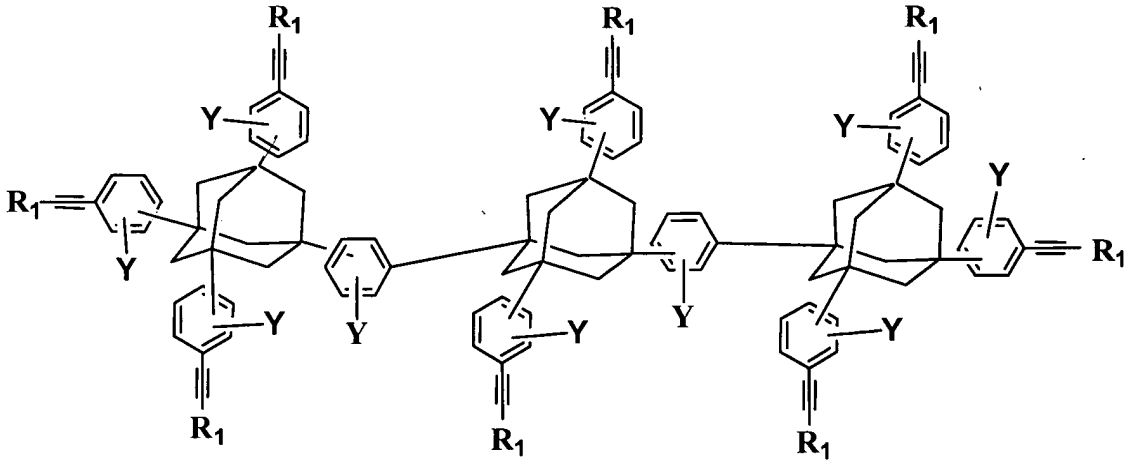
or the structure of Formula XII:



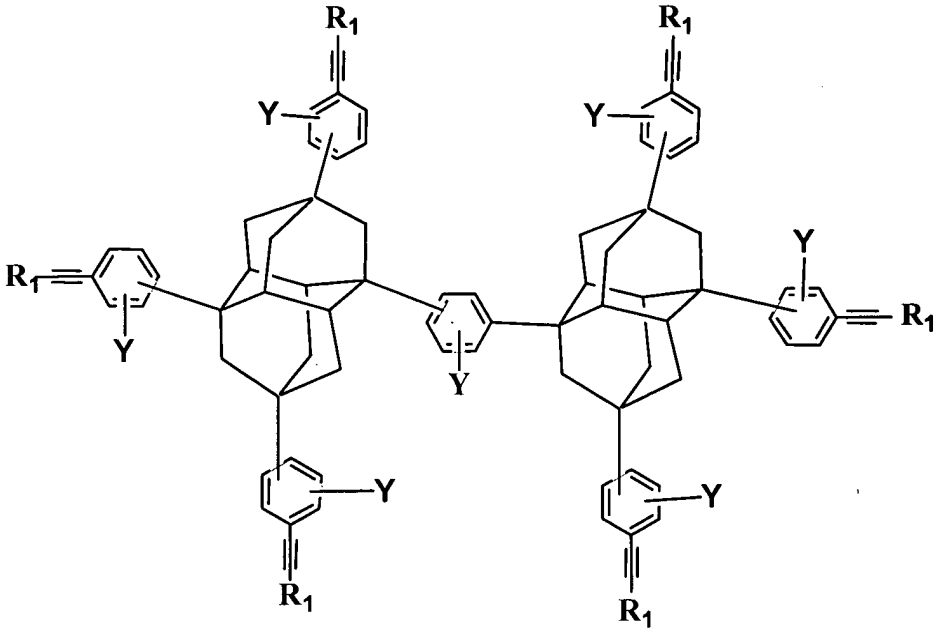
75. (Added) The composition of claim 55, wherein the thermosetting component comprises a mixture of the compound of Formula IX



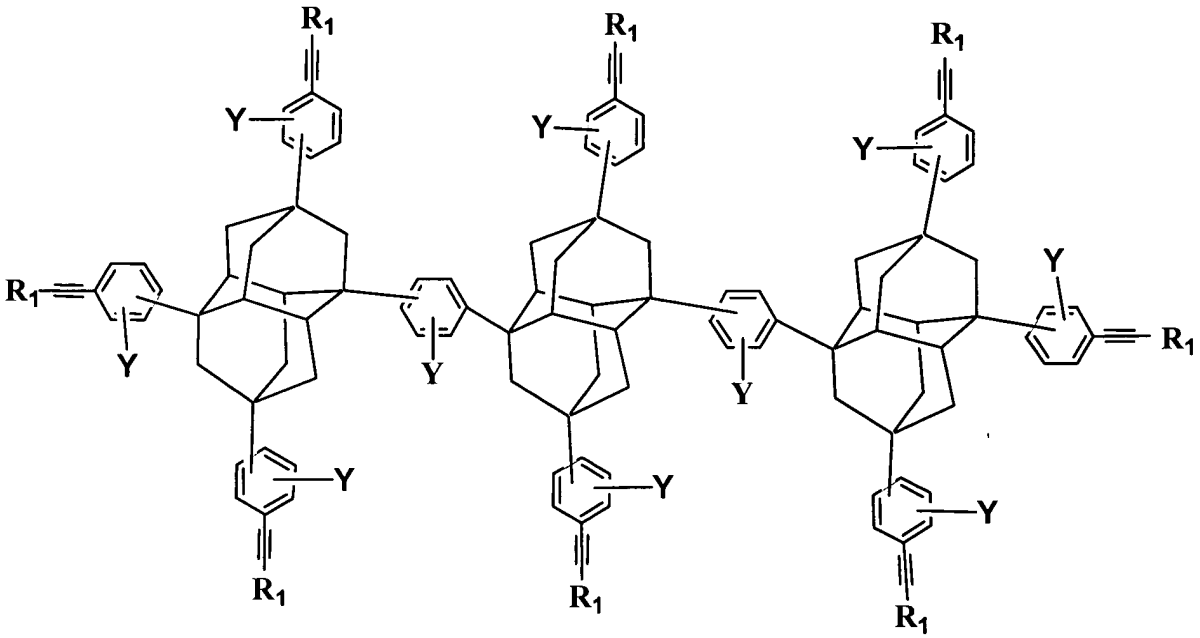
and Formula XI



or Formula X



and Formula XII



76. (Added) The composition of claim 75, wherein the thermosetting component, the monomer and the at least one oligomer or polymer comprise adamantane-based monomers.

77. (Added) The composition of claim 76, wherein at least two of the $R_1C{\equiv}C$ groups on the phenyl groups are two different isomers and at least one of the phenyl groups between tw bridgehead carbons of the adamantane-based monomers exists as two different isomers.

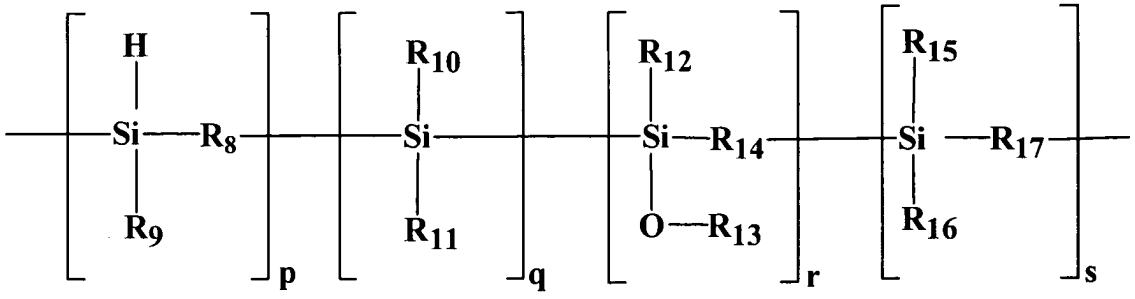
78. (Added) The composition of claim 77, wherein the at least two isomers are *meta-* and *para-* isomers.

79. (Added) The composition of claim 59, wherein the adhesion promoter comprises a compound having at least bifunctionality wherein the bifunctionality may be the same or different and at least one of said bifunctionality is capable of interacting with said thermosetting component.

80. (Added) The composition of claim 79 wherein said adhesion promoter comprises at least one of the following:

silanes of the Formula XXIV: $(R_2)_k(R_3)_lSi(R_4)_m(R_5)_n$ wherein R_2, R_3, R_4, and R_5 each independently represents hydrogen, hydroxyl, unsaturated or saturated alkyl, substituted or unsubstituted alkyl where the substituent is amino or epoxy, unsaturated or saturated alkoxyl, unsaturated or saturated carboxylic acid radical, or aryl, at least two of said R_2, R_3, R_4, and R_5 represent hydrogen, hydroxyl, saturated or unsaturated alkoxyl, unsaturated alkyl, or unsaturated carboxylic acid radical, and $k+l+m+n{\leq}4$;

polycarbosilane of the Formula XXV:



in which R_8, R_{14}, and R_{17} each independently represents substituted or unsubstituted alkylene, cycloalkylene, vinylene, allylene, or arylene; R_9, R_{10}, R_{11}, R_{12}, R_{15}, and R_{16} each independently represents hydrogen atom, alkyl, alkylene, vinyl, cycloalkyl, allyl, aryl, or arylene and may be linear or branched, R_{13} represents organosilicon, silanyl, siloxyl, or organo group, and p, q, r, and s satisfy the conditions of $[4 \leq p + q + r + s \leq 100{,}000]$, and q and r and s may collectively or independently be zero;

glycidyl ethers, or esters of unsaturated carboxylic acids containing at least one carboxylic acid group;

vinyl cyclic oligomers or polymers where the cyclic group is vinyl, aromatic, or heteroaromatic; and

phenol-formaldehyde resins or oligomers of the Formula XXVI: $-[R_{18}C_6H_2(OH)(R_{19})]_t-$ where R_{18} is substituted or unsubstituted alkylene, cycloalkylene, vinyl, allyl, or aryl, R_{19} is alkyl, alkylene, vinylene, cycloalkylene, allylene, or aryl, and t=3-100.

81. (Added) The composition of claim 80, wherein the adhesion promoter is said phenol-formaldehyde resin or oligomer.

82. (Added) An oligomer comprising the composition of claim 79.

83. (Added) A spin-on precursor comprising the oligomer of claim 82 and solvent.

84. (Added) A thermosetting matrix made from the spin-on precursor of claim 83.

85. (Added) A layer comprising the thermosetting matrix of claim 84.

86. (Added) The layer of claim 85, wherein the thermosetting matrix is cured.

87. (Added) The layer of claim 85, wherein the layer has a dielectric constant of less than 2.7.

88. (Added) The layer of claim 87, wherein the layer has a dielectric constant of less than about 2.2.

89. (Added) The layer of claim 85, wherein the layer has an average pore size diameter of less than about 20 nanometers.